BIOLOGICAL CONTROL PROGRAM EVALUATION

A Review Team Report

October 1985

ANIMAL AND PLANT HEALTH INSPECTION SERVICE

PLANT PROTECTION AND QUARANTINE

REPORT

of the

Biological Control Program Review Team

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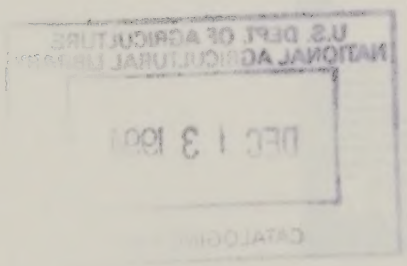
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I. SUMMARY STATEMENT

Evaluation of Plant Protection and Quarantine's (PPQ) biological control program was requested by PPQ management. After thorough study, the review team concluded that a modified organizational structure, revised program guidelines, and maintenance of the multiple laboratory concept are essential if the program is to remain viable and realize its full potential. If adopted, the team's recommendations will increase the commitment by PPQ line personnel and increase overall visibility for the biological control program.

II. RECOMMENDATIONS

Policy

1. Continue as a leader in biological control by assisting research and implementing action projects.

2. Increase the effectiveness of the Biological Control Technical Review Group (BCTRG) by including bench scientists, PPQ line personnel, and a representative from USDA's Forest Service and by emphasizing the need for continuity of membership and meeting attendance.

3. Assure that project proposals are reviewed by scientists prior to submission to the BCTRG.

4. Increase national visibility of the biological control program through aggressive public relations.

5. Adopt a position that end points for projects are tied to the completion of a project's objectives and not to an arbitrary time frame.

6. Take a lead role in establishing an interagency biological control advisory group within the USDA.

7. Utilize contractual arrangements with Federal, State, and private agencies for obtaining short-term research support to supplement that provided by the USDA's Agricultural Research Service (ARS).

8. Develop criteria which clearly distinguish between responsibilities of methods development and those of the biological control program.

9. Review the biological control program in two years.

Organizational Structure

10. Move biological control program administration from staff to line.

11. Establish a Program Manager position at Hyattsville, Maryland, reporting to the Assistant Deputy Administrator for National Programs, to direct the overall biological control program.

12. Establish a Biological Control Specialist position to provide technical and scientific expertise in program operation and development.

13. Utilize multiple laboratories based on biological and geographical considerations instead of consolidating at a centralized laboratory.

14. Do not locate an ARS scientist at the Mission Laboratory.

Operational

15. Provide an adequate maintenance staff at the Mission Laboratory to maintain specialized environmental equipment.

16. Determine laboratory staffing needs through formal workload analysis.

17. Establish an early warning system at the Mission Laboratory to alert designated personnel of environmental equipment failure.

18. Enlarge the inventory of spare parts at the Mission Laboratory for environmental equipment needs.

III. INTRODUCTION

Biological control (the practice of manipulating natural enemies i.e., parasites, predators, and pathogens for control of pest arthropods and weeds), is one of the alternatives to using chemicals for pest control in agriculture and forestry. As the world's energy resources decline and concern about the environment grows, the potential for greater use of this method of control increases.

This method of pest control has existed in nature since the beginning of time; however, it has not been widely used as a control tool. In fact, research agencies have been the primary participants in efforts to use this valuable but under utilized method of control. By the late 1970's, it was well recognized that an obstacle to maximum utilization of biological control agents was the lack of well organized action programs to ensure efficacious use patterns in the field. In 1980 PPQ began to develop and implement field utilization of biological control agents through mass production, distribution, evaluation, and support of program related research.

The PPQ biological control program began with much enthusiasm and a number of projects succeeded with a subsequent reduction in pesticide use, but interest in this program has declined. Concerned about the apparent lack of commitment and visibility, in May 1985 the Deputy Administrator of PPQ established a review team to evaluate the program. To ensure that the program was evaluated from various viewpoints, the team included representatives from State Departments of Agriculture, Agricultural Experiment Stations, Agricultural Research Service (ARS), and PPQ's line and staff organizations.

The review team was charged with the following objectives:

A. Review the established biological control program goals, objectives, and guidelines, to update or modify them based on current needs.

B. Review current procedures for selecting, developing, and implementing biological control projects. Determine if existing procedures are appropriate and, if not, modify them to improve program results.

C. Review program activities at the Mission, Texas, and Niles, Michigan, laboratories to assess activities and accomplishments. Make recommendations on resource needs and other areas of concern.

D. Review the existing organizational structure of biological control and the interrelationships between laboratory/staff personnel with the field organization. Make recommendations for increasing organizational effectiveness which will benefit PPQ and further the accomplishment of biological control objectives.

E. Make recommendations on the future of the PPQ biological control program specifically addressing such items as funding, personnel, additional rearing facilities, etc.

F. Determine whether an ARS employee should be stationed at the Mission Laboratory.

All of the above items were scrutinized by the review team. The following section treats each item in turn.

IV. DISCUSSION OF FINDINGS AND RECOMMENDATIONS

A. PROGRAM GOAL, OBJECTIVES, AND GUIDELINES

The original biological control program goals, objectives, and guidelines were reviewed. Though the original guidelines were helpful when the program was first established, new guidelines are proposed to meet current program needs. These guidelines contain a clear statement of APHIS' biological control program goals and objectives and provide step-by-step instructions for submitting proposals for new biological control projects.

PROGRAM GOAL STATEMENT:

To develop the biological control program by taking actions necessary to optimize the use of biological agents in controlling pests of agriculture

and by providing an operational bridge between the research community and the State/industry/public.

OBJECTIVES:

1. Demonstrate program operation in augmentative biological control with the participation of State, industry, and grower groups.

2. Develop and coordinate Federal/State programs for distribution of promising biological control agents throughout the range of a pest.

3. Produce biological control agents and hosts/prey in support of augmentation research oriented to project implementation.

4. Assist the research community in providing economic evaluations for biological control projects.

5. Assess operational program effectiveness and provide for evaluation of program impact to user groups.

6. Provide technical advice to States.

GUIDELINES: See Attachment 1 for proposed Guidelines as revised.

B. PROCEDURES TO SELECT, DEVELOP, AND IMPLEMENT PROJECTS

A review was made of procedures to select, develop, and implement projects to determine whether the current process is adequate. One problem has been the lack of consideration given proposals from the viewpoint of scientists and line personnel; therefore it is recommended that the Biological Control Technical Review Group (BCTRG) be expanded to include a representative from the USDA Forest Service, bench scientists from State Agricultural Experiment Stations, and PPQ line personnel. Another problem involves continuity of the BCTRG's membership in that different people are often sent for each meeting. Additionally, attendance at meetings is sporadic. As both of the latter problems ultimately reduce the effectiveness and productivity of the BCTRG, it is essential that efforts be made to encourage continuity in group membership and meeting attendance.

In an effort to screen out proposals that are inappropriate or unfeasible, the team recommends establishment of a "pre-proposal" system (as outlined in Section VI of the revised Guidelines). Also, the team recommends that formal proposals be reviewed by bench scientists outside of PPQ and the BCTRG, prior to final evaluation by the BCTRG.

The review team proposes eliminating arbitrary criteria for project termination. It is recommended that end points for projects be tied to realization of a project's original objectives and not to an arbitrary time frame.

C. REVIEW OF PROGRAM ACTIVITIES AT MISSION AND NILES

Findings regarding Niles Laboratory - The Niles Laboratory has pioneered in the development and implementation of large-scale biological control strategies, i.e., the cereal leaf beetle (CLB) and alfalfa weevil (AW) projects. Projects are well-planned, organized, and implemented. The Laboratory provides excellent support for line and cooperator operations.

Program limitations are due to policies external to the Laboratory. For example, a lack of adequate funds and personnel ceiling limitations result in under utilization of facilities. The Laboratory Director was asked by the review team to prepare a staffing chart depicting needs for future operation of the Niles Laboratory (See Attachment 2). The team was unable to verify specific staffing needs because of time constraints. Therefore, it is recommended that a formal workload analysis be conducted to determine whether the staffing and organization recommended by the Laboratory Director will provide a staff at a level commensurate with current project responsibilities and allow sufficient flexibility for future projects. An additional problem identified at the Niles Laboratory is that PPQ has been premature in turning projects over to the States or in dropping projects. An example of premature termination is the cereal leaf beetle project formerly conducted at Niles. This problem is further addressed in Section IV-E of this report.

The review team recommends continued operation of the Niles Laboratory because it (1) alleviates problems caused by quarantine and other regulatory considerations (State and Federal restrictions on movement of pests or pest strains), which could restrict the ability to provide and distribute beneficial organisms; (2) is logistically and environmentally suited to address target pests that are primarily associated with northern, northeastern, and midwestern agriculture; and (3) provides the capacity and flexibility essential to continue and expand the biological control program.

The Niles Laboratory is presently engaged in two projects. The first project is alfalfa weevil which will continue to phase down if the present rate of accomplishments continue. Activities on the second project, Coccinella septempunctata (aphid predator), will be increased in 1986, with full implementation in 1987. Potential projects for the Niles Laboratory include: (1) production of beneficial organisms for the Colorado potato beetle in support of research and/or for implementation activities, (2) production and/or distribution of biological control agents of European corn borer, and (3) providing technical expertise and/or biological control agents on cereal leaf beetle. Other projects are possible and include producing biological control agents for musk thistle, spider mites, fall armyworm, and Heliothis. These latter projects will require consideration by the BCTRG before implementation.

Findings regarding Mission Laboratory - The Laboratory is logistically and environmentally located to address the pest problems associated with southeastern and southwestern agriculture. It has the facilities and flexibility essential to meet the development and mass production needs of the APHIS biological control program. The staff includes varied biological disciplines which are supportive to the total program. In addition, the laboratory is located at Moore Field with other APHIS support functions such as aircraft operations, methods development centers, and the Mexican fruit fly rearing facility, all of which benefit the biological control program. Other findings include the following: (1) Full-time skilled maintenance personnel are not available for highly specialized equipment. Equipment failure will seriously impede rearing operations. (2) Custodial personnel are inadequate. This could result in contamination of the laboratory affecting rearing operations. (3) Production of parasites for the rice and sugarcane borers is presently being conducted at the Mission methods development center rather than the biological control laboratory. This activity should be administered by the biological control program. (4) Critical spare parts inventory for

environmental equipment is inadequate. (5) An emergency warning system for environmental equipment failure is on site and should be installed immediately. (6) The original biological control buildings require additional maintenance and/or renovation to remain operational. These buildings were previously used for rearing parasites of citrus blackfly. (7) Detailed project parameters and instructions are occasionally insufficient for effective field implementation. (8) Laboratory staff may need to be increased now that the facility is on line (See Attachment 3).

The review team recommends the following: (1) expand the inventory of critical spare parts for environmental equipment, (2) install an emergency warning system for environmental equipment failure, (3) justify program staffing needs as recommended by the Laboratory Director (Attachment 3) by performing a formal workload analysis, (4) employ full-time skilled personnel to maintain and service highly specialized environmental equipment, (5) employ custodial personnel to maintain the biological control facility in sanitary condition, (6) transfer the sugarcane and rice borer program and funding (currently with methods development) to biological control, (7) proceed with plans to renovate original biological control buildings, and (8) develop project parameters and instructions in greater detail to allow for better field implementation as well as to provide laboratory and field personnel with a better understanding of what is expected.

The Mission Laboratory is presently engaged in four projects (i.e., citrus whitefly, silverleaf nightshade, Colorado potato beetle, and diffuse and spotted knapweed). Potential projects include: leafy spurge, rush skeletonweed, European corn borer, musk thistle, greenbug, fall armyworm, predaceous mites, boll weevil, southwestern corn borer, Heliothis, and Russian knapweed. Although some of the projects are primarily located within the northwest (i.e., biological control of rangeland weeds), the Mission Laboratory would provide rearing and administrative support.

D. ORGANIZATIONAL STRUCTURE AND INTERRELATIONSHIPS

Overall direction of the biological control program is presently provided by a Senior Staff Officer assigned to the Technology Analysis and Development Staff (TADS). This Senior Staff Officer is also responsible for both the Mission and Niles Laboratories. The current structure presents an unwieldy arrangement for staff and line interface resulting in the following organizational deficiencies:

1. Biological control assumes the appearance of a project rather than a major national program and therefore does not compete effectively with other programs for commitment by line managers.

2. The communication and decision processes between field managers who conduct ongoing projects and staff who provide program direction are cumbersome due to excessive organizational layering.

3. Program support provided by the staff and laboratories must compete for both funds and personnel from allocations to the National Program Planning Staff, and then within TADS, although such support is an integral part of the operational program.

For the continued success of both current and future projects, it is essential that the biological control program receive maximum visibility as a distinct entity within PPQ. The program must also be given the flexibility necessary to parallel other line programs and capture its equitable share of agency resources. Therefore, the following recommendations are made with the understanding that without their adoption the biological control program cannot achieve the stated goals and objectives.

It is recommended that the biological control program be placed under the Assistant Deputy Administrator for National Programs (see Attachment 4, Option #1). The organizational structure as recommended (1) moves the overall program management from staff to the line organization by establishing a Program Manager position reporting to the Assistant Deputy Administrator for National Programs, and (2) provides for enhanced technical direction and program recognition by establishing a Biological Control Specialist position reporting to the Program Manager. The Program Manager will maintain the overall responsibilities presently held by the Senior Staff Officer including the management of both current and future laboratories. The Biological Control Specialist will provide technical guidance to the program and Program Manager and will function as a liaison with the research community in project development (see Attachment 5 for detailed duties of Specialist). Full-time secretarial assistance will be required for the Program Manager's office.

E. FUTURE OF BIOLOGICAL CONTROL PROGRAM

PPQ leadership role in biological control. The review team strongly recommends that PPQ continue in a leadership role in assisting biological control research and implementation of biological control projects. Commensurate with that role it is further recommended that APHIS take a lead in establishing an interagency biological control advisory group within the U. S. Department of Agriculture, to 1) provide a Federal focus for biological control research and development, 2) provide a mechanism for interagency communication and coordination of such activities within the USDA and with other agencies, and 3) provide a mechanism for formulating uniform Departmental policy in matters concerning biological control. This group should be composed of scientific representatives from ARS, APHIS, Forest Service, Cooperative States Research Service, Economic Research Service, Extension Service, and liaison representatives from other Federal agencies (e.g., Environmental Protection Agency, Department of Defense, Department of Interior), State research and action agencies, and private industry.

Aggressive efforts to publicize PPQ's biological control program are required to increase national program visibility. More support is required from the Legislative and Public Affairs Staff by way of updating old pamphlets and displays and in developing new publicity documents. There is also a strong need to provide and publish project evaluation documents to publicize successful biological control implementation projects. Special efforts should be made to complete the cereal leaf beetle project report and develop a similar report for the citrus blackfly project, both eminently successful projects.

Development and implementation of future projects. Recommendations have been made in Section IV-B above and in the proposed revised Guidelines (Attachment 1) to improve the procedures for selection of projects. Other recommendations made in previous sections of this report also impact on the future direction of PPQ's biological control program. These include reference to the

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qeed for specific criteria to distinguish between methods development and biological control responsibilities in project development and implementation. The review team believes that methods development work relating to biological control should either be conducted by or be under the leadership of the biological control program.

It is recommended that end points for projects be tied to the original objectives rather than to an arbitrary time frame. The problem has been that PPQ has heretofore turned projects over to States or dropped projects too early. The cereal leaf beetle (CLB) project which involved four species of parasites serves as an example. In New Jersey, only two species of parasites of CLB were released during the PPQ project. At that time, the pest had not reached its full geographical potential in the State. Since then, CLB has become widely distributed throughout New Jersey, and the State now needs the other two CLB parasites. In view of its past experience in the project and its experienced personnel, PPQ should be an obvious source for at least limited supplies of these parasites. PPQ must maintain a minimum capability for providing biological control agents to States under such circumstances.

The review team believes that organizing biological control laboratories along geographical lines rather than a centralized facility with satellites would provide greater flexibility in addressing regional pest problems. Each laboratory would be independent, but to the extent possible would provide whatever support is necessary for projects centered at another laboratory. For example, the Mission Laboratory, with its rearing capabilities, would provide rearing support for the Niles Laboratory as may be required.

A facility at Bozeman, Montana, is necessary for implementing the diffuse and spotted knapweed project in the Northwestern United States. This facility will be located in the State's new facilities at Montana State University. At this time the Bozeman facility should function as a satellite of the Mission Laboratory. However, additional projects addressing western rangeland weeds will likely be developed. It is thus possible that the Bozeman facility could develop into a third independent laboratory to serve western regional needs for biological control of weeds and insects and thus conform with the team's recommendation for multiple facilities.

Lastly, the team recognizes the need for direct research support for the biological control program to supplement that provided by the ARS. Because some needs are unique, urgent, and short-term, the team recommends that additional research support should be provided through contractual arrangements with Federal, State, and private agencies.

Funding - Increased funding will be necessary for the following reasons: (1) increased utility and maintenance costs now that the Mission Laboratory is operational, (2) costs for additional laboratory personnel, (3) costs for program management staff (additional positions), and (4) since 1982 although the number of projects has increased, biological control funding has decreased (see Attachment 6).

Personnel - Increased staffing needs were noted during the reviews of the Niles and Mission Laboratories (see Section IV-C and Attachments 2 and 3). The team recommends that formal workload analyses be conducted in order to determine staffing needs at the Laboratories for current and future programs.

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The team also recommends that the Program Manager be provided with full-time secretarial help and with a Biological Control Specialist to contribute needed scientific expertise in project/program operation and development (see Section IV-D and Attachment 5).

Facilities - The team notes that the present facilities seem quite adequate for the current program and allow for some expansion. No new facilities other than those at Bozeman are deemed necessary at this time. Should demand for biological agents exceed PPQ's capabilities, other State or commercial facilities could be utilized under contract.

F. AGRICULTURAL RESEARCH SERVICE SCIENTIST AT MISSION

The review team recommends that an ARS scientist not be located at the Mission Laboratory for the following reasons:

1. The Mission staff can handle current program needs for research/ and development.

2. There are excellent relations with the ARS laboratory at Weslaco, Texas, and the Texas Agricultural Experiment Station at College Station.

3. There is excellent technical expertise available in the Methods Equipment Center at Mission.

4. An ARS scientist would be isolated, lose some flexibility, be required to redirect efforts often to meet the needs of the various projects, have little time for publication, and possibly not have sufficient data for publication.

Other locations, such as the ARS Laboratories at Weslaco, Texas, or Stoneville, Mississippi, are preferable to Mission should PPQ feel the need for an ARS scientist to be assigned to the biological control program.

The review team does recognize a need for direct research support for the biological control program in excess of that presently provided by ARS and recommends that these short-term needs be met through contractual arrangements with Federal, State and private agencies.

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PROPOSED REVISED GUIDELINES

GUIDELINES FOR PPQ ACTION PROGRAMS IN BIOLOGICAL CONTROL

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October 1985

I. INTRODUCTION

Pest control is a necessary process in protecting our natural resources, agricultural crops, and human health. Methods of pest control are dependent upon technological capability, economic feasibility and social acceptability. Each of these factors involves value judgments based on available information, cost/benefit considerations, seriousness of the pest problem, increasing pesticide resistance, public concern, and political climate. Because of these considerations, biological control is becoming an increasingly utilized method of pest control. The term "biological control" as used in these guidelines applies to the practice of manipulating parasites, predators, and pathogens for control of pest arthropods and weeds.

Three approaches to manipulation of biological control agents are:

1. Importing and establishing foreign biological control agents,

2. Conserving indigenous agents, and

3. Augmenting existing controls with effective biological control agents.

Each approach involves specialized technology and a different mix of organizational inputs. Research requirements vary between the various approaches, but all require research support during implementation and evaluation. In fact, research agencies have been the primary participants in efforts to utilize this valuable but under used method of pest control. A well recognized obstacle to maximum utilization of biological control is lack of well organized action programs to insure efficacious use patterns in the field. Lack of action programs has greatly delayed acceptance and greater use of biological control in agriculture. Action programs are not considered a research function, and more properly fit into the responsibility of action agencies such as the State Departments of Agriculture and the Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ). Participation of these agencies, with PPQ in a leadership role and cooperating with research and other components of the agricultural industry, materially benefits the producer and the general public by greater use of this environmentally sound means of pest control.

Utilization of biological control organisms is often limited because:

1. Introduced biological control organisms do not get distributed to all locations where they can be utilized, and

2. Some natural enemies must be produced on a large-scale in order to promote utilization by user groups in augmentation programs.

APHIS contributes towards solution of these problems by developing field utilization of biological control agents through mass production, distribution and evaluation.

II. GOAL AND OBJECTIVES

A. Goal:

To develop the biological control program by taking actions necessary to optimize the use of biological agents in controlling pests of agriculture, and by providing an operational bridge between the research community and the State/industry/public.

B. Objectives:

1. Demonstrate program operation in augmentative biological control with the participation of State, industry, and grower groups.

2. Develop and coordinate Federal/State programs for redistribution of promising biological control agents throughout the range of a pest.

3. Produce biological control agents and hosts/prey in support of augmentation research oriented to project implementation.

4. Assist the research community in providing economic evaluations for biological control projects.

5. Assess operational program effectiveness and provide for evaluation of program impact to user groups.

6. Provide technical advice to States.

III. SCOPE OF ACTION

The current channels for distribution of biological control agents are research organizations and a limited number of commercial and government operated facilities. Less used distribution channels for these agents are Federal and State regulatory agencies which have developed expertise in this area. These agencies can obtain technologies for handling, storage, transport, release and evaluation of most agents from research scientists. Although these agencies have succeeded in biological control projects, increased use of biological control agents in expanded programs requires a system with additional organization and coordination. Such a system can be implemented by PPQ within its nationwide network of personnel moving research results into a utilization phase.

Agricultural Research Service, U.S. Department of Agriculture, (ARS, USDA), currently provides facilities and permanent staff at four strategically located overseas laboratories and four domestic regional biological control quarantine receiving facilities. The domestic regional quarantine facilities provide for more basic aspects of biological control research and evaluation of results of beneficial insect colonization programs. One of their prime functions is to promote close liaison between State and other Federal agencies conducting colonization and other studies. ARS overseas laboratories carry out their own assigned research responsibilities and occasionally accommodate scientists from the U.S. on temporary assignment. Some State research and

action agencies are also involved in exploration for new biological control agents and/or maintain quarantine receiving facilities. These are generally devoted to State biological control programs only, but on occasion provide support for interstate or national programs.

A. Distribution

Once a beneficial species has been cleared through quarantine and established, there is a need to assure that it is distributed to all areas where its host is a new introduction or an economic problem. Extensive redistribution of a beneficial species is not a true research function. Rather it is a developmental and operational activity requiring research support. Thus, beneficial insect re-distribution should be the responsibility of APHIS and State action agencies, to see that benefits of a successful introduction and establishment program are fully realized.

B. Mass Production

Some native and foreign natural enemies can suppress pest populations to below economic thresholds through properly timed and strategically located release of adequate numbers of laboratory or otherwise produced stock. Such releases may be inoculative and depend on natural enemy reproduction in the field for suppressive effect, or they may be inundative releases for direct control. APHIS facilities can mass produce such control agents and provide culture technologies for public and commercial use.

C. Evaluation

Evaluation is a key aspect of a biological control program. Unfortunately, many biological control programs have been evaluated only on the basis of whether or not an organism has become established, with little attention given to the degree of control obtained. Effectiveness must be documented if a program is to be justified and implemented. Program evaluation should emphasize the biological agent's impact upon the pest species and the economic aspects of crop yield or quality.

Both biological and economic evaluations are an integral part of APHIS biological control projects. Evaluations must have base line data on which to judge environmental and economic benefits. Sufficient information on the economic impact of pest species has, in most cases, not been developed. This type data is needed to evaluate the impact of biological control. These data can be developed as part of ongoing survey activities within affected States or developed as part of national pest surveys. The Economic Research Service should participate from the onset of project evaluation.

D. Regulatory

Federal and State regulatory agencies are involved with coordinating and policy-making groups dealing with implementation of biological control projects. Possible need for active regulatory measures must be identified for each project. Regulatory representation on project planning groups insures that the project does not ignore regulatory hazards. PPQ will participate with the State(s) to regulate the movement of hosts or pests into a free area or areas undergoing intensive suppression activity.

E. Project Examples

The following projects are examples of how the Agency has helped implement the use of natural enemies.

Cereal Leaf Beetle - The cereal leaf beetle, Oulema melanopus (L.), feeds on wheat, oats, barley, and other small grains. Shortly after its introduction in Michigan in 1962, a chemical eradication program was initiated. Although unsuccessful, the eradication attempt helped slow the spread of the pest and provided valuable time for the introduction and execution of a biological control project. This project redistributed natural enemies already established in some parts of Michigan. A PPQ laboratory was established at Niles, Michigan, to help rear and release beneficial organisms against the cereal leaf beetle. Four parasite species originally introduced from Europe were redistributed to Northeastern and mid-Western United States where they are now helping control the pest. Viewed as a pioneering program for PPQ biological control, the cereal leaf beetle project is a model for future natural enemy re-distribution projects.

Citrus Blackfly - Originally a native of South Asia, but now infesting portions of Texas and Florida, the citrus blackfly Aleurocanthus woglumi Ashby, is a severe pest of citrus. Eradication with insecticides was generally unsuccessful and led to increased emphasis on introduced natural enemies. Biological control was accomplished by redistributing introduced parasites such as Encarsia species and Amitus hesperidum Silvestri. With the aid of State and Federal cooperators, APHIS reared or collected and then redistributed these parasites to blackfly infested areas not having parasites. As a result, citrus blackfly populations in both Texas and Florida occur at below economic levels.

Alfalfa Weevil - The alfalfa weevil, Hypera postica (Gyllenhal), causes serious economic damage in many alfalfa-producing areas of the United States. Introduced parasites brought about effective weevil control where they became firmly established in the Northeastern States. Thus, the alfalfa weevil project was initiated to redistribute these parasites throughout all major alfalfa production areas in the U.S. The project began in the mid-West, with subsequent expansion to all States where the eastern and western strains of alfalfa weevil occur. Surveys of target areas initially determined which parasite species were needed, and where. Colonization attempts were made after surveys were complete, and parasites for redistribution were obtained from field collections and/or laboratory cultures.

Mexican Bean Beetle - This project was a State/Federal demonstration of the use of parasites in augmentative biological control. The project refined and standardized on-going biological control activities in New Jersey, Maryland, Delaware, and Virginia. The introduced eulophid parasite, Pediobius foveolatus (Crawford), was used in the four-State area to demonstrate the effectiveness of properly timed releases of parasites for control of Mexican bean beetle, Epilachna varivestis Mulsant. Since this parasite does not overwinter, laboratory-reared Pediobius were released in "nurse" plots planted with early season snap beans, a preferred host of Mexican bean beetle. These nurse plots provided an early breeding ground for the parasite to produce parasitized Mexican bean beetles. As beetle populations increased in adjacent soybean fields, the parasites spread from the nurse plots to the soybeans.

Once in the soybeans, the parasites exerted good control of the bean beetle and often eliminated the need for insecticides. Knowledge gained from this project on implementing large-scale releases of Pediobius is now available for use by other interested States or farm communities .

Citrus Whitefly - The objective of the project was to redistribute parasites of citrus whitefly, Dialeurodes citri (Ashmead), throughout the Southeastern United States. The introduced parasite, Encarsia lahorensis (Howard), has been successful in reducing whitefly populations on citrus and ornamental plants in California and Florida. Nursery stock infested with parasitized citrus whitefly produced at the Mission Laboratory (Texas) has been distributed to numerous locations from Texas to North Carolina. An evaluation program coincides with the parasite release project to ascertain the degree of pest suppression and resultant benefits. It is hoped that the parasites will bring about control of citrus whitefly in the new areas where parasites are established.

Silverleaf Nightshade - Silverleaf nightshade, Solanum elaeagnifolium Cav., is an economically important perennial weed infesting cotton and other crops. It is found primarily in the Southwestern United States. An alternative to expensive cultivation and herbicide application is the use of a leaf-galling nematode, Orrina phyllobia (Thorne). The project for biological control of silverleaf nightshade is developing and refining technology necessary to evaluate large-scale control by augmentative release of the nematode. This native nematode causes extensive galls on the leaves, stems, and flowers of silverleaf nightshade and can severely stunt and weaken infected plants. Studies are on-going regarding host specificity, distribution, virulence, and behavior of the nematode. The ultimate goal is to demonstrate the nematodes suitability as an augmentative biological control agent against this weed.

Colorado Potato Beetle - The Colorado potato beetle, Leptinotarsa decemlineata (Say), is a pest of potatoes, tomatoes, and eggplant in many parts of the United States. The insect has developed varying degrees of pesticide resistance from Virginia to Maine and westward to Ohio. Interest in biological control of this pest has increased greatly since the late 1970's. The egg parasite, Edovum puttleri Grissell, appears to have significant potential for augmentative biological control of Colorado potato beetle. APHIS is cooperating with the ARS and others to help develop this introduced agent for field implementation.

Diffuse and Spotted Knapweed - APHIS is sponsoring a cooperative effort to help ranchers control diffuse and spotted knapweed, Centaurea diffusa Lam. and C. maculosa Lam., on their rangeland. The project has been initiated in Montana with the re-distribution of introduced seed head flies which are already established in parts of Montana. With the addition of other beneficial organisms, biological control offers ranchers a solution which is long term and considerably more cost effective when compared to other means of control.

Aphid Predator - This project deals with redistribution of the sevenspotted lady beetle, Coccinella septempunctata L.. This exotic lady beetle has long been recognized in Europe and Asia as an important predator because it feeds on over 200 aphid species including green bug, pea aphid, alfalfa aphid, and green peach aphid. It has become the dominant lady beetle predator in parts of the Northeastern United States and has an advantage over many native lady

beetles because it does not migrate over long distances in search of prey or overwintering sites. Agricultural crops with major aphid pests will benefit from this project as the sevenspotted lady beetle becomes established throughout the United States.

IV. ROLE OF PARTICIPANTS IN ACTION PROJECTS

APHIS participation in biological control is based on regulatory and/or grower management needs. In re-distribution projects such as cereal leaf beetle and citrus blackfly, biological control tactics are employed to suppress newly introduced pests of economic importance. In these instances, APHIS assumes overall leadership for mass production and shares responsibility with State agencies for distributing biological control agents. Both APHIS and State agencies cooperate with research, extension and grower groups for necessary support suring the project. As a part of a grower management project such as the Mexican beetle project, overall management and policy making for the project resides in a coordinating group composed of members representing each active participating agency. The roles of the various agencies are as follow:

1. APHIS and State agencies as the action groups assume field leadership and are responsible for production and distribution of the biological agents. Industry involvement is encouraged.

2. Research agencies and institutions are solicited for back up and to assist action agencies in execution and field evaluation.

3. Federal and State agencies identify the potential of biological agents for the management program and participate in devising plans and procedures for the project and its evaluation.

4. Growers participate by cooperating in field aspects and may share costs as the project develops.

5. Extension services are solicited for an information education program so that growers and the general public understand the project and its contributions.

PPQ line personnel and cooperators play a key role in survey before and during the biological control project. The initial survey determines the distribution and location of plant hosts, pests or pest complex, and of existing control agents. The pest distribution within the project area is catalogued and the presence or absence of control agents noted. During and following release of control agents, data are gathered on geographic distribution and density of pests and newly established biological control agents.

PPQ operations center on the production and distribution of biological control agents. When feasible, field collection sites are established and used as a source of natural enemies for redistribution.

Specialized technology is necessary to optimize conditions of handling, rearing, and releasing natural enemies with subsequent establishment and evaluation. Sufficient information is usually available to do these things on

a very limited scale, but implementation projects often require a much larger dimension, necessitating additional information. Some of this work is done in the field where pest problems occur and the remainder is done at locations where expertise and facilities are available.

V. PROJECT SELECTION PROCEDURES

An APHIS-sponsored Biological Control Technical Review Group (BCTRG) advises in selection of new biological control projects for implementation. The BCTRG is composed of representatives from PPQ, the Agricultural Research Service, Cooperative States Research Service, Forest Service, Extension Service, and the Economic Research Service of the U.S. Department of Agriculture, State Agricultural Experiment Stations, the Environmental Protection Agency, and the National Plant Board. The objectives of the group are as follow.

1. Evaluate proposals for cooperative biological control action projects.

2. Identify agencies which can contribute to the implementation of projects selected.

3. Identify additional research or development work needed before a project can be implemented.

4. Provide a forum for the development of biological control action projects.

5. Advise on the degree of agency participation and general time frames for phasing in and out of selected biological control projects.

VI. SUBMITTING PROPOSALS

Government and private agencies and institutions are encouraged to submit biological control proposals to PPQ for evaluation as possible implementation projects. The procedure to do so is relatively simple and involves only two steps. First, submit a pre-proposal. If the pre-proposal passes the initial screening, a formal proposal will then be requested.

A. Submitting Pre-proposals

Pre-proposals should include the information indicated below. Note that the intent of the pre-proposal is merely to summarize candidate projects--it should not exceed two pages.

1. Descriptive project title.

2. Name, affiliation and phone number of submittor(s).

3. The project objective(s) - a 1-3 sentence description.

4. Implementation rationale and proposed workplan--this is the most important section and should be as specific as possible.

These pre-proposals do not require formal signatures, institutional approvals nor supporting documents such as institutional agreements or special certificates. They may be submitted to APHIS at any time (see address below).

B. Submitting Formal Proposals

Following an internal review of pre-proposals, a formal proposal will be requested from those who passed the initial screening.

The following basic criteria must be addressed when preparing formal proposals:

1. Potential impact and safety of the biological control agent.
2. Methodology available for rearing, release, and recovery of the natural enemy, and estimated costs.
3. Methodology available for evaluation of organism's impact.
4. Economic impact of the pest.
5. Crop management practices which are likely to impact the project.
6. Positive and negative factors likely to impact on program implementation, i.e., grower interest, pesticide resistance, rearing problems, mobility of natural enemy.

Formal proposals must be received by December 15 of any given year to be considered at the subsequent BCTRG meeting. All correspondence should be sent to the following address:

Biological Control Program
U.S. Department of Agriculture (USDA)
Animal and Plant Health Inspection Service (APHIS)
Plant Protection and Quarantine (PPQ)
6505 Belcrest Road, Room 600A
Hyattsville, Maryland 20782.

Formal proposals are then evaluated by the BCTRG in light of the following factors:

1. Significance of involved crop to U.S agriculture.
2. Present or potential impact of the pest species and the extent of information available on the biology and economics of the pest.
3. Level of participation expected or needed by cooperating agencies and groups.
4. Potential for project being carried on by State agency, industry, or user group following APHIS withdrawal.

5. Availability and acceptance of other control measures.

6. Geographical range of the pest problem.

7. Project implementation costs.

8. Potential for program success.

VII. PROJECT INITIATION AND TERMINATION

Initiation of biological control projects within APHIS depends upon the following factors:

1. Recommendation from the BCTRG.

2. Approval of the Deputy Administrator for PPQ.

3. Availability of funds.

Termination of a project is dependent upon one or more of the following items:

1. If evaluation shows project is neither effective nor efficient.

2. If State agencies, grower groups, or private enterprise take over the project.

3. If the value of the project has been proven, and it has developed the most efficient technology which the groups and agencies directly involved can assume.

4. If a satisfactory level of control is achieved on a continuing basis by self-perpetuating biological control agents.

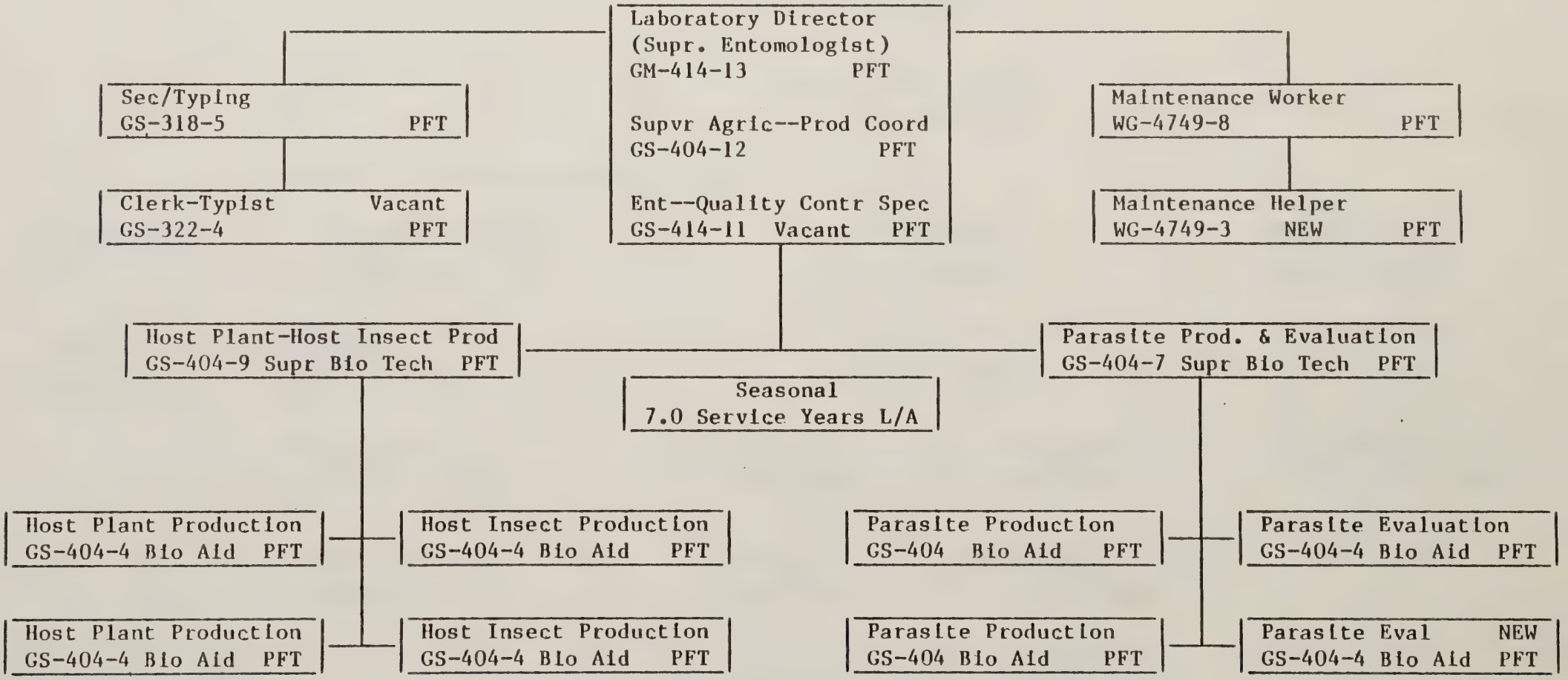
5. If sufficient releases of species have been made to optimize the possibility of establishment.

6. If the goals of the project have been achieved.

These actions would be considered and responses developed by the coordinating group composed of representatives of all agencies and groups involved.

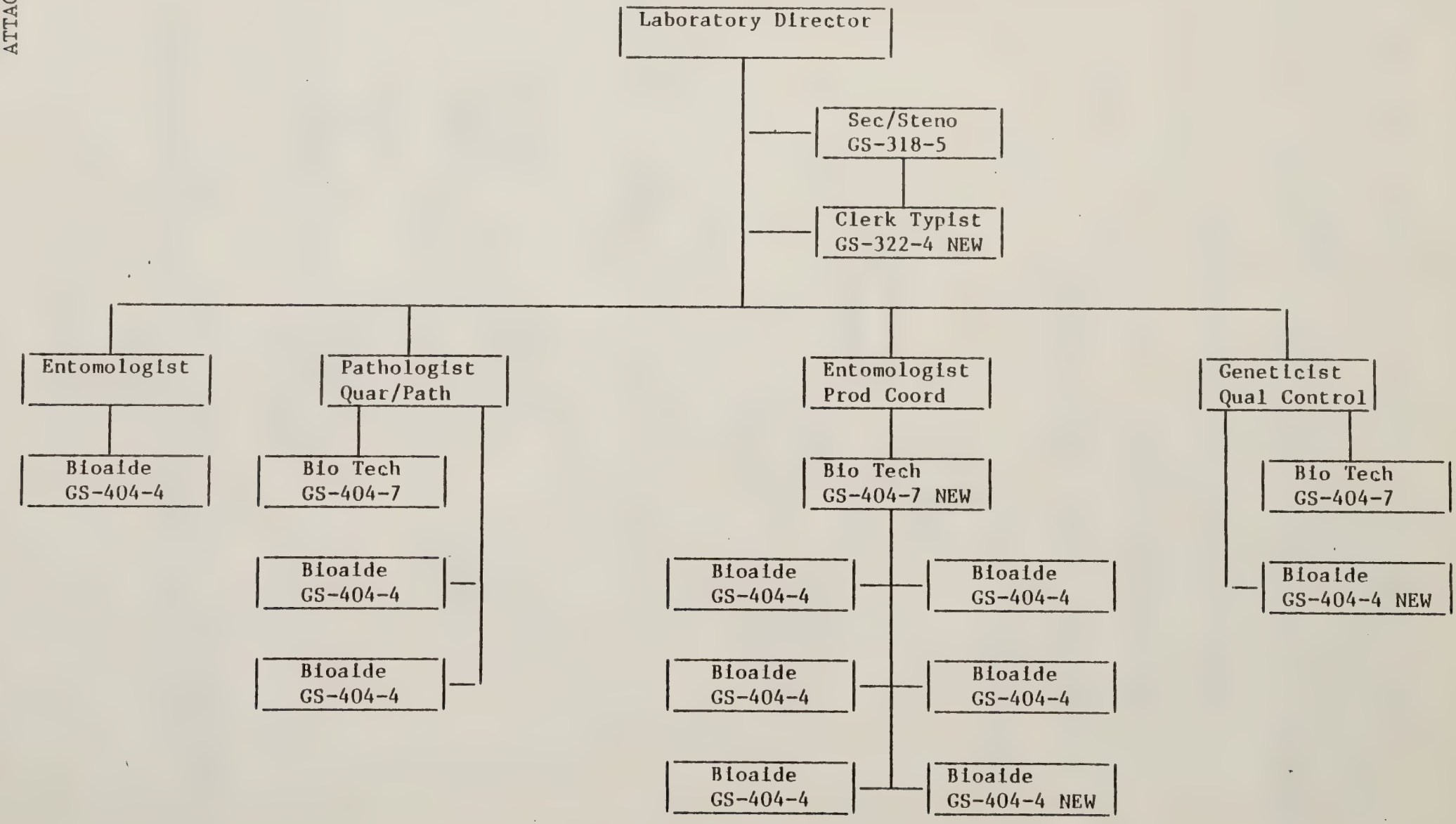
ATTACHMENT 2

PROPOSED STAFFING, NILES



ATTACHMENT 3

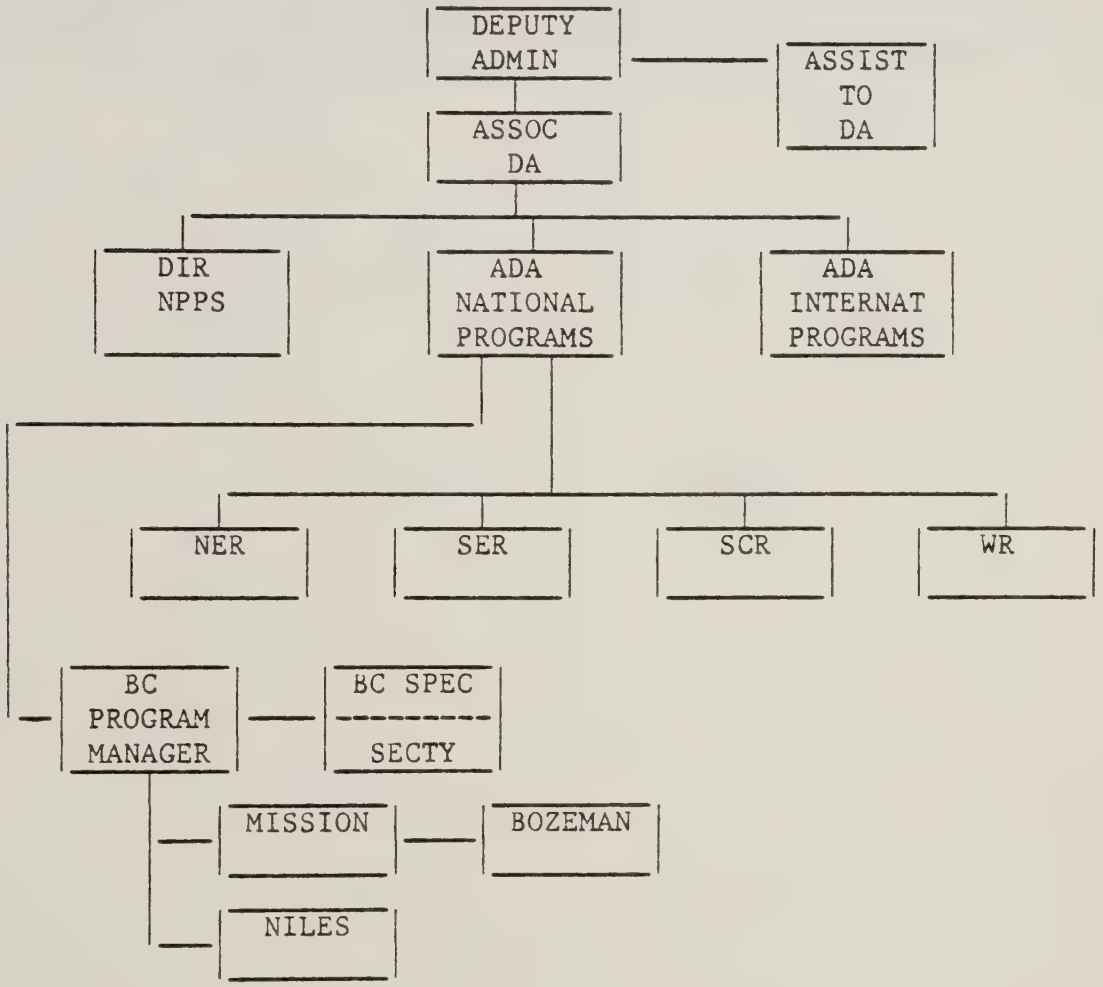
PROPOSED STAFFING, MISSION



REORGANIZATION

OPTION #1

The review team strongly urges adoption of this organizational structure for biological control.



Structural changes proposed:

1. Moves the biological control program out of TADS and associates it with the ADA for National Programs.

2. Creates a biological control Program Manager who reports to the ADA for National Programs.

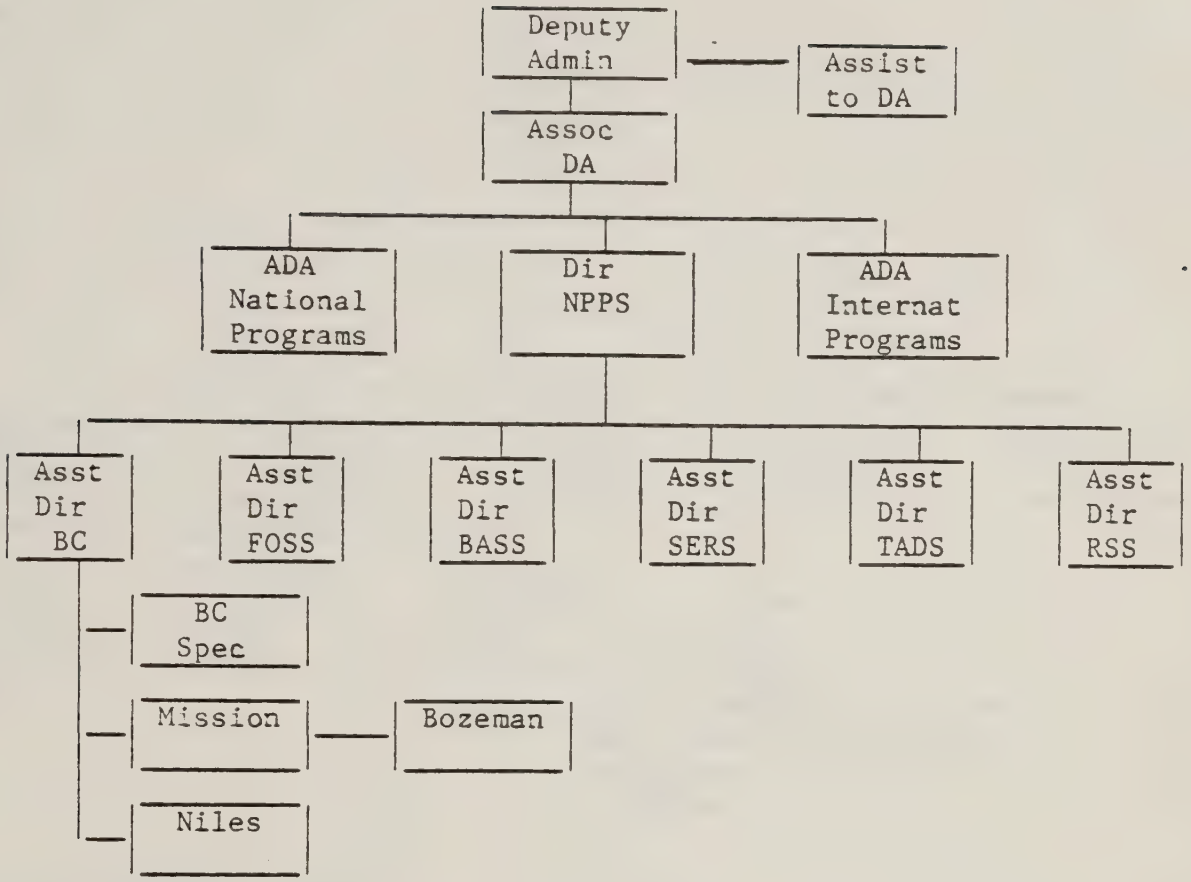
3. Creates a position of Biological Control Specialist who reports to the biological control Program Manager.

Advantages of this organizational structure are as follow: (1) allows optimum utilization of PPQ resources, (2) increases regional input during fiscal and program planning, (3) removes two layers of management from above the biological control program, (4) allows the line portion of PPQ to have earlier input on budget, personnel, and project activities, (5) removes possibility of the biological control program sharing fiscal problems within NPPS, (6)

provides greater flexibility for funds and personnel to be redirected to biological control when necessary, (7) establishes biological control as a distinct entity and provides it with visibility as a national program, (8) strengthens line commitment to biological control, (9) creates a biological control Program Manager at headquarters who is the focal point for all program direction, and (10) creates a biological control specialist who is assigned to the Program Manager and helps provide focus to the program.

Options two through six which are outlined on the following pages were also considered; however, none of them is comparable to the option selected. All had disadvantages which cause them to seriously lessen the prospects for a successful biological control program.

OPTION #2



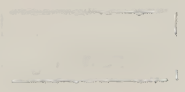
Structural changes proposed:

1. Keeps the biological control program within NPPS, but moves biological control out of TADS.

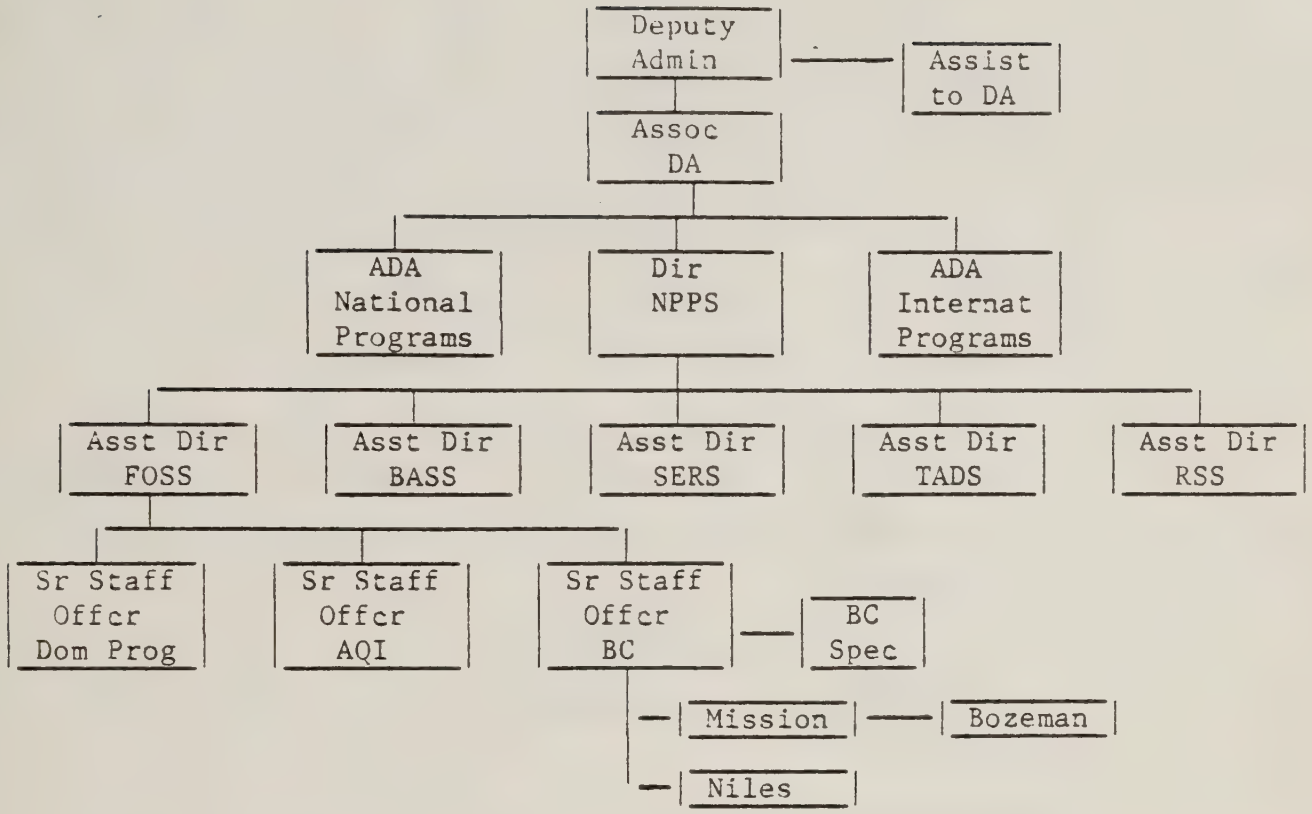
2. Creates a new Assistant Director for Biological Control reporting to the Director of NPPS.

3. Creates a position of Biological Control Specialist who reports to the Assistant Director for Biological Control.

In addition to having few or none of the advantages offered by the recommended Option (#1), Option #2 has the following disadvantages: (1) personnel and funding ceilings remain limiting to biological control program development; (2) biological control program visibility is improved over the present structure but remains inadequate; (3) there is no improvement in line commitment to biological control projects; and (4) the biological control Assistant Director remains in the staff and as a result of not being in the line organization is reduced in efficiency and the program loses effectiveness.



OPTION #3



Structural changes proposed:

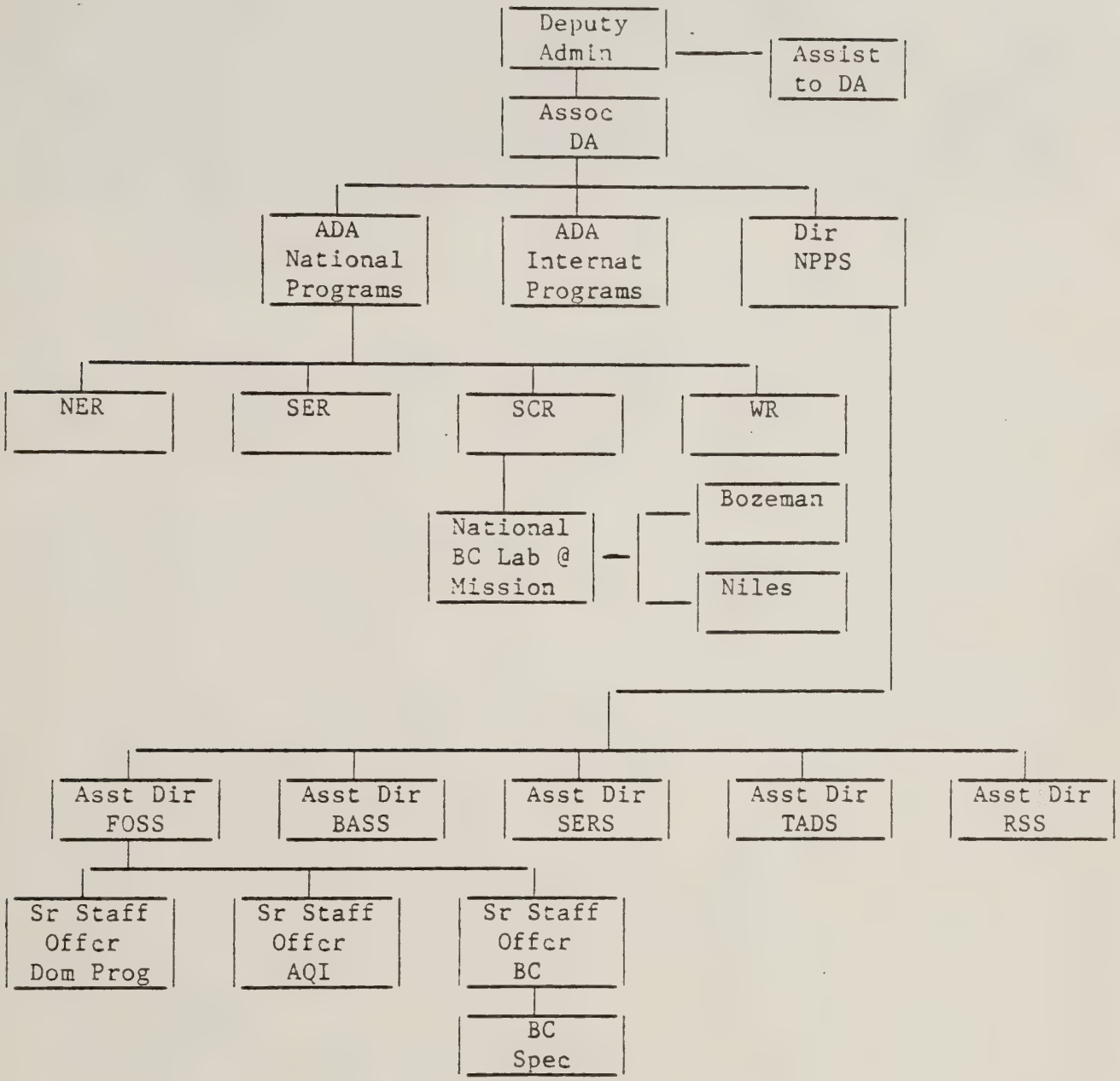
1. Keeps the biological control program within NPPS but moves it from TADS to FOSS.

2. Moves the biological control Staff Officer from TADS to FOSS.

3. Creates a position of Biological Control Specialist who reports to the Staff Officer for biological control.

In addition to having few or none of the advantages offered by the recommended Option (#1), Option #3 has the following disadvantages: (1) personnel and funding ceilings remain limiting to biological control program development, (2) visibility of the biological control program is not improved, and (3) there is no improvement in PPQ line commitment to the biological control program.

OPTION #4



Structural changes proposed:

1. Designates the Mission Laboratory as the National Center for biological control.

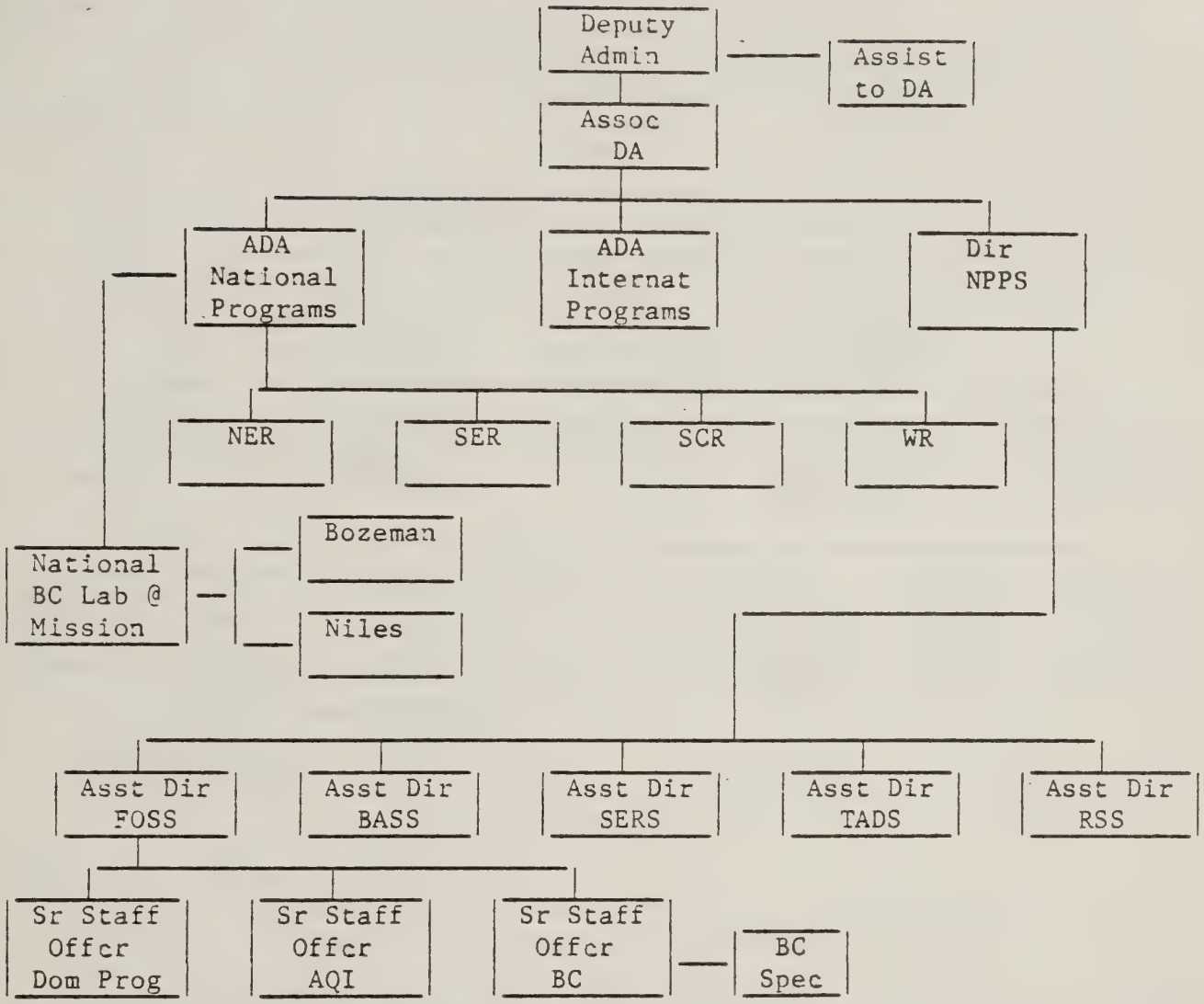
2. Designates the Laboratory Director of the Mission Laboratory as the supervisor for all other laboratories in the biological control program; the Mission Laboratory Director reports to the Regional Director for the South Central Region.

3. The Staff Officer for biological control is moved from TADS to FOSS.

4. Creates a position of Biological Control Specialist who reports to the Staff Officer for biological control.

In addition to having few or none of the advantages offered by the recommended Option (#1), Option #4 has the following disadvantages: (1) associates biological control program with a region rather than promoting a national scope, (2) could lead to interregional conflicts, (3) increases a Regional Director's span of control and increases his responsibility to management of a national program, (4) formal lines of communication within the biological control program are unnecessarily cumbersome, and (5) places the Director of the Mission Laboratory in the line rather than the actual person who is responsible for the program.

OPTION #5



Structural changes proposed:

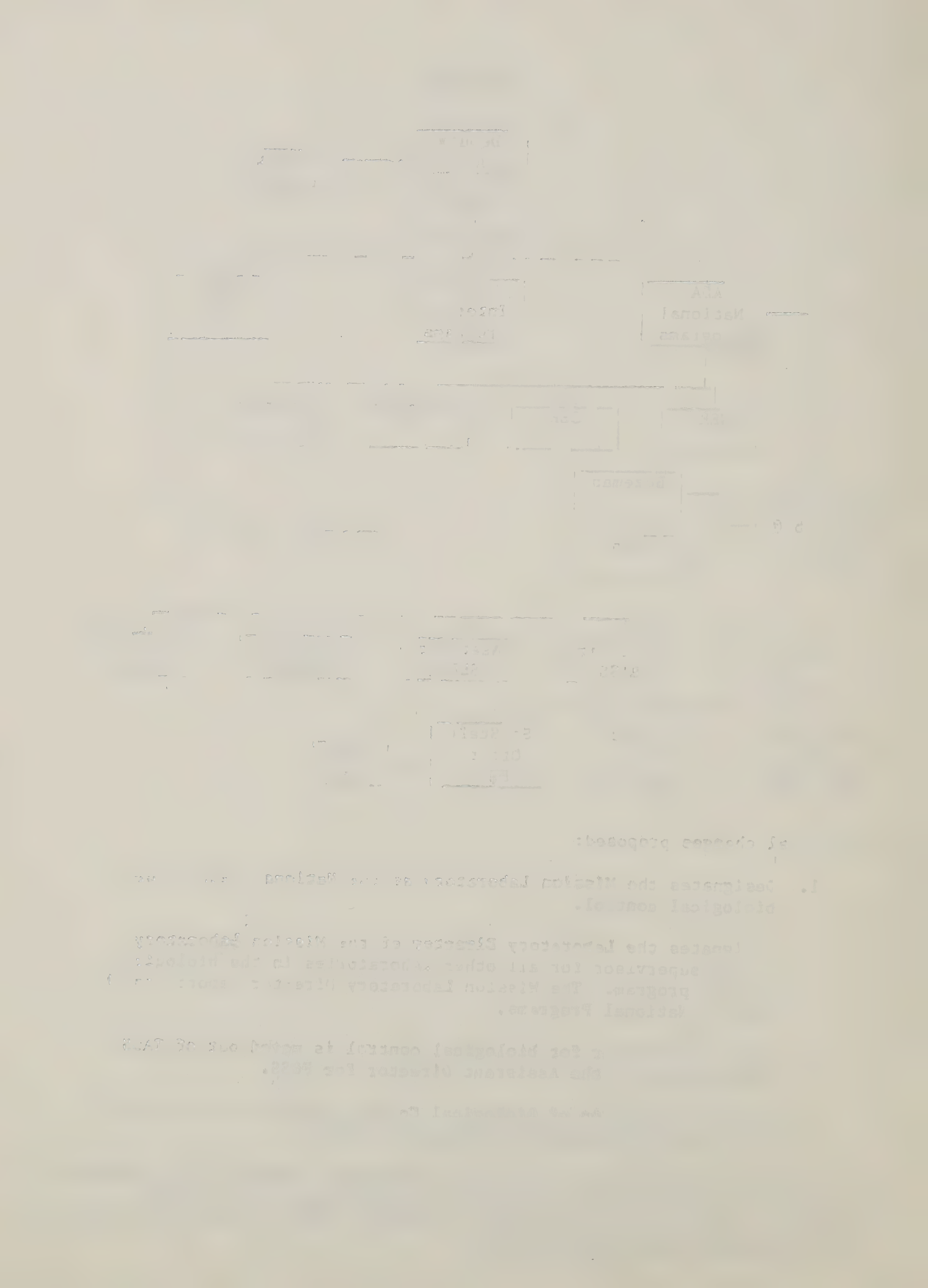
1. Designates the Mission Laboratory as the National Center for biological control.

2. Designates the Laboratory Director of the Mission Laboratory as the supervisor for all other laboratories in the biological control program. The Mission Laboratory Director reports to the ADA for National Programs.

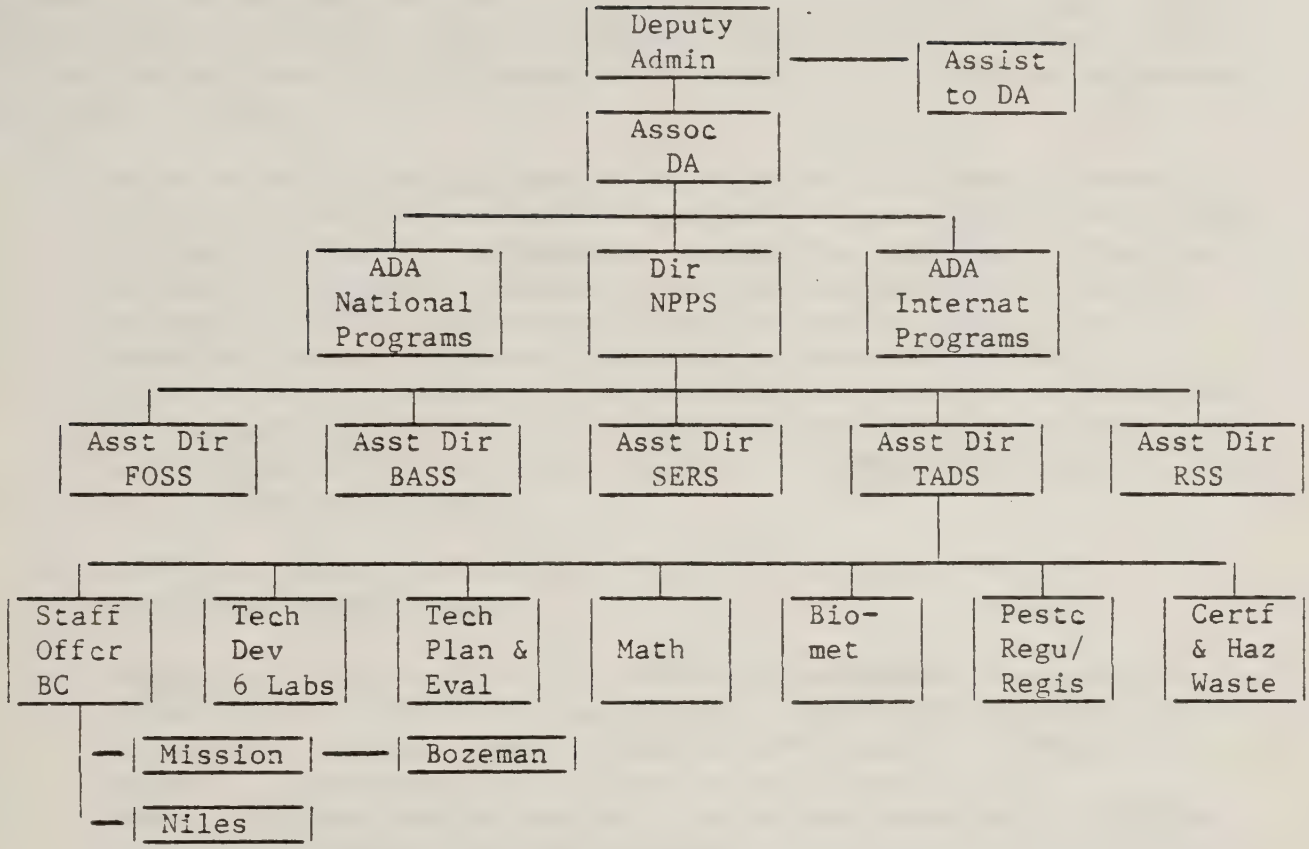
3. The Staff Officer for biological control is moved out of TADS and assigned to the Assistant Director for FOSS.

4. Creates a position of Biological Control Specialist who reports to the Staff Officer for biological control.

In addition to having few or none of the advantages offered by the recommended Option (#1), Option #5 has the following disadvantages: (1) reduces visibility of the biological control program and national perspective, and (2) does not provide for a Program Manager.



OPTION #6



Structural changes proposed:

1. Make no changes in the present organizational structure.

In addition to having few or none of the advantages offered by the recommended Option (#1), Option #6 has the following disadvantages: (1) the biological control program assumes the appearance of a project rather than a major national program, (2) communication and decision processes between field managers and staff are cumbersome due to excessive organizational layering, (3) biological control program support for staff and laboratories is seriously limited by allocations to NPPS and within NPPS, and (4) does not have a Biological Control Specialist.

changes proposed:

no changes in the present organizational structure.

LIST OF DUTIES FOR PROPOSED BIOLOGICAL CONTROL SPECIALIST

The Review Team urges that a Biological Control Specialist be hired and assigned to the Program Manager for contributing scientific expertise in project/program operation and development. The role or function of the technical support position proposed for the office of the Program Manager would be as follows:

1. Serve as an active liaison between university/Federal research scientists and PPQ to solicit proposal submissions, to supervise proposal review by appropriate scientists, and help during the process of selecting proposals for new PPQ biological control projects. This function would include onsite visits with selected research groups, reviewing current scientific literature, and attendance at selected meetings in order to seek out potential projects. It would also entail working with scientists to obtain proposals which are compatible with PPQ and scientific requirements.

2. Serve as Executive Secretary for the Biological Control Technical Review Group.

3. Prepare for publication the APHIS-PPQ documentation needed for previous and current PPQ biological control projects and the collective program. This documentation would be oriented to farmers, the general public, scientists, legislators, administrators, and/or media. The purpose would be to provide current and historical perspective on the roles and activities of the PPQ biological control program.

4. Assist the Program Manager and Laboratory Directors in the planning of facilities, budgets, personnel needs, and program development.

5. Plan and help develop selected activities for certain PPQ biological control projects, including the development of impact evaluation methodology and data collection and utilization.

6. Seek out advisors and/or solutions to technical questions which occur while conducting projects

7. Serve as a post-project coordinator to optimize the prospects for continuing project activity in the absence of PPQ such as in augmentation demonstration projects. This would include working with managers of private insectaries, State Departments of Agriculture, and grower groups to help in transferring a project from PPQ to non-federal agencies or private enterprise.

8. Develop a library of support documentation for previous and current PPQ biological control projects. This would include scientific and nonscientific literature and photographs which could be used by PPQ staff for oral presentations.

RECORD OF PROGRAM FUNDING

FY 1980 THROUGH 1986 BIOLOGICAL CONTROL APPROPRIATIONS
(In Thousands of Dollars)

Fiscal Year	$ Appropriated
1980	1,609
1981	3,463
1982	3,877
1983	3,480
1984	3,250
1985	3,310
1986	3,310 House Estimate 3,349 Department Estimate